



Responses to Examiner's Remarks

Double Patenting

Regarding Examiner's remarks on double patenting, Applicant will file a terminal disclaimer subject to final claims allowed.

Claim Rejections – 35 USC 102

Re Claim 4 Rejection:

Claim 4 discloses ". . . a diaphragm separate from the housing such that the diaphragm can make contact with a body and vibrate in response to body sounds and can be attached or adhered to said body"

Examiner states that Grasfield (US Patent 6,005,951) discloses such an invention. Reading Grasfield's specification and drawings discloses no such diaphragm. The Grasfield invention discloses a stethoscope with diaphragm attached, with no mention of the ability to use the diaphragm in a detached manner, or to adhere the diaphragm to a body. Applicant respectfully requests that Examiner show precisely where Grasfield discloses the present invention, specifically with regard to the diaphragm being used in a manner than it is detached from the stethoscope.

It is of great importance to further understand that a detached diaphragm renders prior art stethoscopes inoperable due to air leakage. Specifically, Grasfield's invention requires that sound travel up tubing to microphones. With a detached diaphragm, the tubing would be open and no air pressure buildup and acoustic transmission would be possible. Grasfield neither mentions a detached or adhered-to-body diaphragm, nor suggests it. On the contrary, such a method would render Grasfield unworkable.

The detached diaphragm invention is therefore counter-intuitive to the operational principles and physics of prior art stethoscopes which rely on closed systems that conduct sound via sealed structures not open to the atmosphere.

Considering further differences between Grasfield and Claim 4, the present invention discloses a ". . . capacitance-to- electrical conversion means . . ." wherein the diaphragm is in contact with the body. Grasfield's invention, as shown in Grasfield Fig 9, shows a microphone 54, at the top of a stethoscope tube. It is therefore impossible for the microphone, Grasfield's electrical transducer, to make physical contact with the body. Grasfield's invention is therefore entirely different from that claimed in Claim 4, on multiple counts.

Applicant therefore submits that Grasfield fails to disclose or suggest in any way the separated diaphragm as claimed, or the transducer as claimed.



Re Claim 6 Rejection:

Claim 6 discloses ". . . a provision for adjustment of diaphragm dynamic characteristics including tension and resonance frequency."

Examiner cites Grasfield (col. 8, lines 21-25):

"In the second topology illustrated in Fig. 9, the resonant frequency of the combined tube structure of the first and second acoustical conduits 62, 64 can be adjusted by increasing or decreasing the length of the second acoustical conduit contained within the electronic housing."

Examination of Grasfield's Fig. 9 shows that elements 62 and 64 are stethoscope tubes.

Claim 6 of the present invention states that diaphragm characteristics are adjusted. The invention makes no mention of tubing adjustments as stated in Grasfield, and conversely, Grasfield makes no mention of adjusting a diaphragm. Stethoscope tubes and stethoscope diaphragms are completely different elements of a stethoscope and the adjustment of tubing length is unrelated to adjustment of diaphragms. The physics are also unrelated, in that tubing length resonances relate to the standing wave and dimensional characteristics of an acoustical conduit, whereas diaphragm characteristics are a function of the diaphragm material, its mounting, and other such factors.

Applicant therefore submits that Grasfield fails to disclose the diaphragm adjustment, and makes no suggestion thereof.

Re Claim 17 Rejection:

Examiner states that Greenberger (US Patent 5,492,129) discloses all the elements of Claim 17 in the present invention. Claim 17 of the present invention discloses a device for output of signals to multiple stimulus transducers, to be detected electromagnetically by input transducers. Greenberger discloses none of the elements of Claim 17.

Greenberger's invention performs acoustic input rather than electromagnetic input and output, has no output stimulus transducers, has no multi-channel audio signal source, and no coupling of stimulus and input transducers as described in Claim 17.

Greenberger is simply a different invention.

Claim 17 of the present invention describes a method for sending sounds electromagnetically from a signal source into a stethoscope. It therefore completely different from prior art stethoscopes which are structured to detect body sounds. Claim 17 addresses the generation of sound from an audio source into a stethoscope, not the detection of body sounds as in Greenberger. The use of electromagnetic signals driven by an audio source is completely novel.

Referring to Examiner citation, Greenberger (col. 5, lines 38-42), Greenberger refers here to input transducers used for adaptive noise canceling by picking up acoustical sounds. The present invention refers to input transducers that are picking up sounds from stimulus transducers, not acoustical sounds as in Greenberger. This is an entirely different mechanism, structure and purpose from that disclosed in Greenberger. In Greenberger, acoustic operation is in place and in the present invention, electrical coupling is operational.

Greenberger discloses an entirely different invention from that in Claim 17.

Claim Rejections - 35 USC 103

Re Claim 1 Rejection:

Examiner states that Pluvinage (US Patent 5,987,146) discloses or suggests an opening that would allow ambient sound to enter the space behind a stethoscope diaphragm.

Pluvinage's invention is a hearing aid which allows sound to travel into a listener's ear canal. Pluvinage uses the term "open ear canal hearing aid". The purpose of the Pluvinage invention is to keep the ears open so that the person wearing the hearing aid can hear sound besides that being produced by the hearing aid. Pluvinage's invention is focused on the structure of hearing aid eartips, whereas Claims 1-3 are concerned with the structure and method of operation of the housing of a stethoscope with a body sound sensor. The present invention is a sound detector, whereas Pluvinage's eartip design is concerned with the coupling of output sound through a listener's ear canal. Those skilled in the art would not see any correlation between the two inventions.

In the present invention, the opening to ambient sound is intended to change the acoustics of the stethoscope sensor housing, by opening the housing of the stethoscope transducer to ambient sound for the purposes of eliminating the effects of ambient sound. The purposes is therefore the opposite to that of Pluvinage (transmission to the hard of hearing listener in Pluvinage as opposed to elimination of the effects of a closed housing in Claim 1), and is structurally that of a human ear canal as opposed to a stethoscope housing and diaphragm. Pluvinage makes no suggestion of applying this principle to a stethoscope housing and is describing a hearing aid eartip that fits inside a person's ears, and Grasfield makes no suggestion to combine his diaphragm housing with that of an open canal hearing aid eartip.

The prior art disclosed in Pluvinage is significantly different from that of Claim 1 structurally, physically, and in its purpose, with no suggestion of combination with Grasfield. This combination of prior art does not suggest, in any way, Claim 1.

Re Claim 2 Rejection:

As stated above for Claim 1, Pluvinage addresses the structure of an hearing aid eartip.

Regarding Claim 2, Examiner cites Pluvinage (col. 5, lines 47-51), wherein Pluvinage discloses a membrane at the end of an eartip for keeping ear wax out of the eartip channel. Not only is this descriptive of a different device, for a different purpose, but the reference makes no mention of opening or closing any aperture of any kind, as claimed in Claim 2.

Pluvinage therefore fails to disclose or suggest in any way the essential elements of Claim 2.

Re Claim 3 Rejection:

As stated above for Claim 2, Pluvinage cites a hearing aid eartip which has a membrane to prevent ear wax from clogging the hearing aid sound conduit.

In Claim 3, the membrane structure is placed in a stethoscope housing wherein sound is detected from a body, and resonance from ambient sound is to be eliminated through opening the housing cavity rather than closing it. The membrane is in place for the purposes of moisture and humidity.

Pluvinage's ear wax membrane in a hearing aid eartip is significantly different in purpose and structure, and fails to disclose or suggest Claim 3.

Re Claim 12 Rejection:

Examiner states that Claim 12 is rejected on the same grounds as Claim 1, which would imply that Grasfield in combination with Pluvinage suggests Claim 12.

Applicant finds no reference in Grasfield or Pluvinage to the elements claimed in Claim 12, specifically to "storage or output means that stores of outputs both the ambient sound electrical signal and the diaphragm displacement transducer signal."

Applicant respectfully requests Examiner indicate the specific references in Grasfield and Pluvinage that suggest the electrical output of two parallel signals, one being ambient sound and the other being a diaphragm displacement signal.

Re Claim 5 Rejection:

Claim 5 is dependent on Claim 4, which has been discussed in detail above as being very distinct over the prior art. Claim 5 is distinct over the prior art in view of the original invention of the diaphragm as claimed in Claim 4.

Re Claim 8 Rejection:

Claim 8 has been amended and combined with Claim 9. See Claim 9 Response below.

Re Claim 9 Rejection:

Since Claim 9 is now incorporated into Claim 8, the discussion below addresses Examiner's remarks with respect to previous Claim 9. These remarks are now relevant to the Amended Claim 8.

Examiner cites Thomas (US Patent 5,006,952) and Grasfield (US Patent 6,005,951) as addressing the claimed invention in Claim 9.

The prior art does not, in any way, suggest, state, imply or show, the elements claimed in Claim 9, as dependent on Claim 8 (now currently amended Claim 8). The present invention claims an AC signal that drives a diaphragm conductive surface, in contact with a body, wherein the AC signal is a noise-canceling signal to cancel ambient noise.

The specific references cited by Examiner do not disclose or suggest in any way the claimed invention. Applicant respectfully requests that Examiner explain in detail precisely where the prior art discloses a stethoscope diaphragm in contact with a body driven by a noise-canceling signal, and precisely how one skilled in the prior art would combine such references, to arrive at the present invention. Even when applying the common sense test in re KSR v. Teleflex, it seems impossible to arrive at the present invention from the prior art references since the present invention is unique and so significantly different from the prior art cited.

Re Claim 11 Rejection:

Examiner states that Claim 11 has been rejected according to Claims 4-5.

Claims 4-5 claim a structure for a stethoscope system such that the diaphragm is physically separate from the stethoscope housing, as well as a transducer mechanism entirely different from the prior art reference. See above discussion on Claim 4.

Claim 11 claims the application of an AC signal to a diaphragm conductive surface in order to minimize ambient noise. The elements of Claim 11 are sufficiently different from Claims 4-5 such that arguments rejecting Claims 4-5 do not seem to have any connection to Claim 11.

Applicant respectfully requests that Examiner provide further details and references specific to Claim 11 rejection, and how, specifically, the noise-canceling scheme of Claim 11, using AC signals driving the conductive surface of the diaphragm to cancel ambient noise, are suggested in the prior art.

Re Claim 13 Rejection:

Examiner states that Claim 13 has been rejected according to Claims 4-5.

Claims 4-5 claim a structure for a stethoscope system such that the diaphragm is physically separate from the stethoscope housing, as well as a transducer mechanism entirely different from the prior art reference. See above discussion on Claim 4.

Claim 13 addresses the matter of exchangeable diaphragms with full or partial conductive surfaces thereon. Such diaphragms have no application in stethoscopes in general since the present invention uniquely uses conductive surface diaphragms. The modified versions of the conductive diaphragms are therefore even more unique and applicable only to the present invention. Applicant has responded to Examiner's remarks on Claims 4-5, and further requests specific responses to the additional diaphragm elements claimed in Claim 13, and how these are disclosed or suggested by the prior art references.

Re Claim 14 Rejection:

Examiner states that Claim 14 has been rejected according to Claims 4-5.

Claims 4-5 claim a structure for a stethoscope system such that the diaphragm is physically separate from the stethoscope housing, as well as a transducer mechanism entirely different from the prior art reference. See above discussion on Claim 4.

Claim 14 addresses the placement of signal sources i.e. outputs not inputs, on the surface of an object, to be used on conjunction with a capacitance to electrical conversion means. There is no mention of the claimed elements in any of the cited prior art, especially Grasfield, cited by Examiner to reject Claim 4. Applicant respectfully requests that Examiner review Claim 14 carefully and provide citations to the prior art specific to Claim 14 to clarify the remarks.

Re Claim 15 Rejection:

Examiner cites prior art in reference to electrodes.

Claim 15 is dependent on Claim 14, which specifies that the electrodes are attached to an article of clothing, manikin or a doll, and the like. No prior art reference cited by Examiner discloses any such electrode placement, which is entirely novel. The use stimulus electrodes in conjunction with a stethoscope transducer is entirely novel. Claim 15, dependent on Claim 14, is simply not disclosed in the cited prior art, having no practical or implied purpose in stethoscopes not built according to the present invention.

Re Claim 16 Rejection:

Examiner cites Thomas referring to a signal processor for a displacement transducer as suggestive of Claim 16 which claims various signal sources for electrodes placed on an object as claimed in independent Claim 14.

The signal processor disclosed in Thomas is for the purposes of detecting movement in the displacement transducer. It is not related in any way to stimulus electrode drive signals used to couple electromagnetically to a stethoscope transducer. The differences are significant and numerous between Thomas and the present invention.

Conclusion

Applicant proposes that the prior art does not read in any way on the present invention, which is distinctly novel and unique with respect to the prior art cited. Applicant proposes that a meeting with Examiner to clarify the invention and the prior art differences would be most productive. Applicant therefore requests a meeting with the Examiner, should Examiner, upon review of this response, consider the current claims for rejection.

If the Examiner has any questions, he is invited to contact Applicant's attorney at (818) 710-2788.

Respectfully submitted,



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